Hanford Site Environmental Monitoring Plan

Section II.A. Facility Effluent-Monitoring Plans

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Introduction

This section addresses facility effluent-monitoring plans (FEMPs) that are completed and implemented to meet the overall radioactive and nonradioactive monitoring requirements of U.S. Department of Energy (DOE) Order 5400.1 and DOE/EH-0173T. New or modified facilities are evaluated to determine if a FEMP is needed; if so, a FEMP will be completed before startup.

Waste Management Federal Services of Hanford, Inc. has been contracted by Fluor Daniel Hanford, Inc. to maintain the FEMP guidance document (WHC-EP-0438-1) for use by Hanford Site contractors in preparing their facility-specific FEMPs. The FEMP management plan (WHC-EP-0491) describes the relationship of the FEMP to this overall *Environmental Monitoring Plan* and delineates the required contents and DOE and contractor relationships.

The effluent- and emission-monitoring activities for all media, with the exception of groundwater, are addressed by the FEMPs. The monitoring of liquid effluents for nonradioactive hazardous constituents, as defined by the *Resource Conservation and Recovery Act of 1976* (RCRA), is covered in the site-specific sampling analysis plan. Two activities associated with the FEMPs are the determination of the need for a FEMP and the preparation of the FEMP. The FEMP determination consists of an initial evaluation of potential radioactive or hazardous material sources within a facility. If a significant quantity of radioactive or hazardous material is present, then a FEMP is prepared.

Determination of Need for a FEMP

The FEMP determinations were prepared for the individual Hanford Site facilities. In many cases, facilities were grouped by area and the following information was included in each FEMP determination document: an introduction section that includes the current configuration and status of each facility (active, inactive, standby, etc.); an information section that includes a brief facility/process description; a discussion section that includes source-term identification and characterization, radiological/hazardous material inventories at risk, fugitive sources (where applicable), identification of release pathway and effluent point of discharge, and identification and characterization of source terms contributing to each effluent stream; a section that describes the potential upset conditions (assuming failure of a single barrier) for each event, along with the type and amount of material involved, the pathway for potential release, and the offsite dose calculations to be evaluated against the *Clean Air Act Amendments of 1990*, Code of Federal Regulations, Title 40, Part 61 (40 CFR 61), Subpart H, and Washington Administrative Code (WAC) 173-480; a summary section that evaluates the relevant data to determine whether the facility requires a FEMP; and an attachment entitled “Determination of FEMP Requirement” from the guidance document (WHC-EP-0438-1).

Radiological Emissions

Pursuant to 40 CFR 61 and DOE Order 5400.1, a FEMP was prepared for those facilities having the potential to release quantities of airborne radioactive materials that could cause radiation doses in excess of 0.1 mrem/yr effective dose equivalent (EDE) to the maximally exposed individual. A FEMP was also prepared for any facility discharging a liquid effluent regulated by 40 CFR 122 and containing sufficient

radionuclides to cause an EDE greater than 4.0 mrem/yr in any person exposed to the effluent. The release quantities were evaluated at the point of release, assuming no pollution-control equipment was in place but operations were otherwise normal (including expected upset conditions). In this determination process, over 160 potential sources across the Hanford Site were evaluated (e.g., WHC-EP-0498, PNL-10061).

Dose calculation methods and summaries of the FEMP determinations are given in WHC-EP-0498. The FEMP determinations are grouped by Hanford Site operational area and can be found in the following six documents: WHC-EP-0439, WHC-EP-0440, WHC-EP-0441, WHC-EP-0442, WHC-EP-0443, and PNL-10061.

Nonradiological Emissions

A FEMP was also prepared for any facility having the potential to release large quantities of nonradioactive hazardous materials (e.g., exceeding the reportable quantities listed in 40 CFR 302.4) and having no pollution-control equipment in place.

In addition to the FEMP, a sampling and analysis plan is required by RCRA for the monitoring of nonradioactive liquid effluent streams. These plans characterize liquid effluent discharges, account for variations in volumes and contaminant concentrations from operational practices, and consider all the parameters known or suspected to be associated with each liquid effluent stream, such as influence of operational practices, raw-water characteristics, and process knowledge. The results of data analysis are compared against the list of hazardous substances in WAC 173-200 to identify any exceedances and to ascertain compliance with regulations. The results are used to assess the potential for contamination in soils and groundwater.

This sampling complements the routine environmental monitoring program at the Hanford Site and allows analysis of the nonradioactive constituents in the liquid waste streams that are not included in other routine environmental monitoring programs.

Results of the sampling efforts are compiled and archived in the Liquid Effluent Monitoring Information System (LEMIS).

FEMP Preparation

Waste Management Federal Services of Hanford, Inc. has been contracted to coordinate FEMP activities for the Hanford Site contractors and transmits the results of the FEMP preparations to Fluor Daniel Hanford, Inc. for submittal to DOE Richland Operations Office (RL).

The FEMP determinations and the prepared FEMPs are retained by Waste Management Federal Services of Hanford, Inc. for Fluor Daniel Hanford, Inc. Pacific Northwest National Laboratory (PNNL) performs a similar function for the DOE facilities it manages. DOE-RL is informed in a timely manner of any changes to the FEMPs.

DOE Order 5400.5 and DOE/EH-0173T require a quality assurance plan, covering all environmental monitoring activities at the Hanford Site, to be prepared consistent with applicable elements of The

American Society of Mechanical Engineers (ASME) NQA-1. Further, QAMS-005/80 is applicable, and such quality assurance plan is included or referenced in each individual FEMP.

The quality assurance objectives for the monitoring of liquid effluents and air emissions are discussed in WHC-EP-0446-1. The quality assurance objectives for compiling and reporting air emission monitoring are defined in WHC-EP-0528-1.

The FEMPs are prepared in the format specified in WHC-EP-0438-1. Each FEMP includes the following: an introduction, including purpose, scope, and discussion of constituents and applicable regulations; a description of the facility, process, potential sources, and release pathways; a characterization of effluent discharges (both airborne and liquid) that are monitored and the potential contaminant concentrations; an identification and characterization of the effluent-discharge points (both airborne and liquid) and a discussion of the design criteria and technical specifications pertaining to the effluent-monitoring/-sampling systems; a discussion of monitoring and assessment methods different from those specified by the U.S. Environmental Protection Agency and the 5400-series of DOE Orders; historical monitoring/sampling data (if available) and a comparison of data for normal and upset conditions; information regarding sample analysis, including laboratory procedures; notification and reporting requirements; interface with the Groundwater Monitoring Project (managed by PNNL); a discussion of quality assurance; a discussion of internal and external reviews, approvals of changes, and annual reviews; a discussion of compliance with applicable DOE Orders and U.S. Environmental Protection Agency regulations; conclusions, exceptions or exemptions and justifications, and required system upgrades; and applicable references.

Table II.A-1 provides a listing of facilities on the Hanford Site, the prime contractor responsible for managing the facility, and the determination of a need for a FEMP. Because it is not feasible to include each individual FEMP in this *Environmental Monitoring Plan*, an abstract from each noted with a "yes" in Table II.A-1 follows.

Table II.A-1. Facilities Determination Results

Facility	Manager	FEMP Required?
100 Areas		
KE/KW Fuel Storage Basins and Associated Facilities	FDH	Yes
N Electrical Shop	BHI	no
N Reactor	BHI	no
N Paint Shop	BHI	no
Retired Reactors (B, C, D, DR, F, H)	BHI	no
200/600 Areas		
B Plant/Waste Encapsulation and Storage Facility	FDH	Yes
Batch Plant	FDH	No
Fabrication Shops	FDH	No
General Area Services (200 Areas)	FDH	No
Low-Level Burial Grounds	FDH	No
Plutonium Finishing Plant	FDH	Yes

Table II.A-1. (contd)

Facility			Manager	FEMP Required?		
Plutonium-Uranium Extraction (PUREX) Plant			FDH	Yes		
PUREX Pipefitter Shop			FDH	No		
Solid Waste Facilities Compactor			FDH	No		
T Plant			FDH	No		
Tank Farm Complex						
Single-Shell Tank Farms						
241-A	241-AX	241-B	FDH	No	No	No
241-BX	241-BY	241-C	FDH	No	No	Yes
241-S	241-SX	241-TX	FDH	No	Yes	No
241-TY	241-U		FDH	No	No	
Double-Shell Tank Farms						
241-AN	241-AP	241-AW	FDH	No	Yes	Yes
241-SY	244-A	244-TX	FDH	Yes	Yes	No
244-U	244-S	244-BX	FDH	Yes	Yes	Yes
241-AY	241-AZ		FDH	Yes	Yes	
Vaults						
204-AR	244-AR	244-CR	FDH	No	Yes	Yes
Evaporators						
242-A	242-S	242-T	FDH	No	No	No
U Plant/224-U/UO_3			BHI	No		
Uranium-Trioxide (UO_3) Plant			FDH	No		
Waste Receiving and Processing (WRAP) Facility			FDH	Yes		
Waste Sampling and Characterization Facility (WSCF)			FDH	No		
200 Areas Effluent Treatment Facility (ETF)			FDH	No		
200 Areas Treated Effluent Disposal Facility (TEDF)			FDH	No		
200-E Darkroom			FDH	No		
200-E Electrical Shop			FDH	No		
200-W Paint Shop			FDH	No		
202-S (Reduction-Oxidation [REDOX] Plant)			BHI	No		
212-P Nonradioactive Polychlorinated Biphenyl Storage Facility			FDH	No		
222-S Laboratory			FDH	Yes		
224-T Transuranic Waste Storage and Assay Facility			FDH	No		
233-S Facility			BHI	No		
242-B Facility			PNNL	No		
284-E and 294-W Powerplants			FDH	No		

Table II.A-1. (contd)

Facility	Manager	FEMP Required?
2703-E Clinical Environmental Laboratory	FDH	No
2711-E Facility	FDH	No
2718-E Facility	PNNL	No
2911-E Facility	FDH	No
Fitzner/Eberhardt Arid Lands Ecology Reserve (6652)	PNNL	No
Purge Water Storage and Treatment Facility (600 Area)	FDH	No
213-J and 213-K Storage Vaults (600 Area)	FDH	No
616 Nonradioactive Dangerous Waste Storage Facility	FDH	No
622-D Facility	PNNL	No
622-R Facility	PNNL	No
622-S Facility	PNNL	No
300 Area		
300 Area Paint Shop	FDH	No
300 Area Treated Effluent Disposal Facility	FDH	No
300-N Facility	PNNL	No
303-A, B, C, E, F, G, K	FDH	No
303-J Facility	PNNL	No
303-M Oxide Facility	FDH	No
305-B Facility	PNNL	No
305 Hot Cell Verification	FDH	No
306-E Fabrication and Testing Laboratory	FDH	No
306-W Facility	PNNL	No
308 Fuels Laboratory	BHI	No
309 SP-100 Facility	FDH	No
313 and 333 Fuels Fabrication Facilities	FDH	No
314 Facility	PNNL	No
318 Trailer 5	PNNL	No
320 Facility	PNNL	No
321 Facility	FDH	No
323 Facility	PNNL	No
324 Facility	FDH	Yes
325 Building	PNNL	Yes
326 Facility	PNNL	No
327 Facility	FDH	Yes
328 Technical Shops	FDH	No
329 Facility	PNNL	No

Table II.A-1. (contd)

Facility	Manager	FEMP Required?
329 Neutron Multiplier Facility	PNNL	No
331 and 331-A Facility	PNNL	No
331-C Facility	PNNL	No
331-G Facility	PNNL	No
331-H Facility	PNNL	No
334-A Spent Acid Storage	FDH	No
335/335A Facility	FDH	No
337 High-Temperature Sodium Facility	FDH	No
338 Maintenance	FDH	No
340 Complex	FDH	Yes
377 Facility	FDH	No
382 Facility	FDH	No
384 Powerhouse	FDH	No
3621B/C/D Facility	FDH	No
3703 Facility	FDH	No
3704 Facility	FDH	No
3705 Photo Laboratory	FDH	No
3706 Facility	FDH	No
3707 Facility	FDH	No
3708 Facility	PNNL	No
3709 Paint Shop	FDH	No
3717-B Standards Laboratory	FDH	No
3718-F Alkali Metal	FDH	No
3720 Facility (Materials Science Laboratory)	PNNL	Yes
3722 Facility	FDH	No
3730 Facility	PNNL	No
3732 Facility	FDH	No
3745 Facility	PNNL	No
3765 Facility	FDH	No
3790 Facility	FDH	No

Table II.A-1. (contd)

Facility	Manager	FEMP Required?
400 Area		
Fast Flux Test Facility	FDH	No
Fuels and Materials Examination Facility	FDH	No
Maintenance and Storage Facility	FDH	No
4722 B,C Maintenance	FDH	No
4734-B Maintenance	FDH	No
4831 Flammable Storage	FDH	No
4843 Alkali Metal Storage	FDH	No
700 Area		
747 Building	HEHF	No
747-A Facility	PNNL	No
1100 Area		
1100 Tri-City Professional Center Computer-Aided Design (CAD) Room	FDH	No
1100 Tri-City Professional Center Print Room	FDH	No
1154-A Radio Maintenance	FDH	No
1162 Flammable Storage	FDH	No
1164 Hazardous Material Storage	FDH	No
1171 Shop	FDH	No
1171-A Vehicle Wash	FDH	No
1172-A Service Station	FDH	No
1176 Tire Station	FDH	No

BHI = Bechtel Hanford, Inc.
FDH = Fluor Daniel Hanford, Inc.
HEHF = Hanford Environmental Health Foundation.
PNNL = Pacific Northwest National Laboratory.

Environmental ALARA Program

The Hanford Site will implement an integrated environmental ALARA (as low as reasonably achievable) program in accordance with DOE Order 5400.5 and 10 CFR 834 (when promulgated). The program will include 1) the management policy and statement of commitment to the ALARA philosophy, 2) the organizational responsibilities and authority and structure for implementation, 3) an evaluation of

site operations that identifies activities responsible for radioactive releases that could cause a radiation exposure to the public and/or environment, and 4) an overall procedure for analyzing existing and proposed operations and activities to ensure ALARA is practiced. Further, the program will be designed to identify general areas to be considered in environmental ALARA decisions (e.g., societal, technological, economic, public policy). A checklist of evaluation factors, staff requirements, and required records, in addition to the programs already in place on the Hanford Site, will be developed. Fluor Daniel Hanford, Inc., Bechtel Hanford, Inc. and PNNL each have the responsibility to prepare an environmental ALARA program plan.

Potential Unmitigated Doses from Hanford Facilities

Sources of, and potential radiation doses from, airborne releases from Hanford Site facilities are calculated to determine whether a radiation release could result in a dose to the maximally exposed individual of >0.1 mrem/yr EDE. A FEMP is needed for any facility that exceeds this dose level. These determinations are documented and updated on a regular basis. PNNL determinations are calculated from a comprehensive inventory of radionuclides (PNL-10061 describes the method used). Fluor Daniel Hanford, Inc. and Bechtel Hanford, Inc. determinations are performed and documented in WHC-EP-0498, which is currently in revision.

FEMP Abstracts

The FEMPs prepared for the affected facilities given in Table II.A-1 are summarized on the following pages.

KE and KW Fuel-Storage Basins

These fuel-storage basins are located in the 100-K Area adjacent to the Columbia River. The KE and KW Reactors have been shut down, deactivated, and decommissioned. Most of the stored fuel from the KE and KW Reactors was shipped to the 200-East Area reprocessing facilities. After initial laying away, the fuel-storage basins (located inside the 105-KE and 105-KW Buildings) were cleaned and modified for storing N Reactor irradiated fuel. The basin-cooling systems were modified to a closed system, and a leak in the KE basin was repaired. Storage of N Reactor fuel in the basins started in 1975 and continues to the present, but shipments from the reactor ceased in 1989. Monitoring of the groundwater adjacent to the basins for leak-detection purposes is conducted under the Groundwater Monitoring Project managed by PNNL. This FEMP also covers the 1706-KE and 1706-KER Engineering Laboratories, 1908-KE Outfall (i.e., National Pollutant Discharge Elimination System [NPDES] Outfall 004), and 181-KE Filter Screen Backwash Discharge (i.e., NPDES Outfall 003). This last facility does not release hazardous materials in excess of U.S. Environmental Protection Agency standards.

Airborne Effluents

Airborne effluent streams considered include those from the KE and KW Fuel-Storage Basins, 1706-KE and 1706-KER Engineering Laboratories, and 1706-KER Water Studies Recirculation Building. Radionuclides discharged to the air include ^{60}Co, ^{90}Sr, ^{134}Cs, ^{137}Cs, ^{238}Pu, ^{239}Pu, and ^{240}Pu.

Liquid Effluents

One liquid stream located at the 1908-KE Outfall (i.e., NPDES Outfall 004) and routinely sampled was determined to have a low-to-remote potential to exceed the drinking water standard (40 CFR 141) or contain radionuclide constituents specified in DOE Order 5400.5. Radionuclides in this stream, including tritium, ^{60}Co, ^{90}Sr, ^{137}Cs, ^{239}Pu, and ^{240}Pu, are discharged to the Columbia River.

FEMP Determination

A FEMP is required for the KE and KW Fuel-Storage Basins because of the potential for liquid effluents from the 1908-KE Outfall (i.e., NPDES Outfall 004) to contain radionuclide constituents specified in DOE Order 5400.5 or to exceed the 4-mrem/yr drinking water standard. The FEMP (WHC-EP-0497, Rev. 2) was issued in August 1996.

B Plant/Waste Encapsulation and Storage Facility

B Plant is located in the 200-East Area. The plant was originally designed to chemically process spent nuclear fuels but was later modified to individually separate strontium and cesium from the plutonium-uranium extraction (PUREX) fission product waste stream. The cesium and strontium were then encapsulated at the Waste Encapsulation and Storage Facility, and the remaining waste was transferred to the tank farms. B Plant is a permitted treatment, storage, and disposal facility currently operating under interim status with an approved Part A permit. Currently, B Plant is a facility being prepared for shutdown. Its sole mission is to support the safe management and storage of its residual radionuclide inventory. There are currently no production activities at B Plant, but there are several operating systems required to accomplish the current mission. B Plant receives and stores various chemicals from commercial suppliers for treatment of low-level waste generated at the Waste Encapsulation and Storage Facility and for conditioning of water used in heating, ventilating, and air conditioning units.

The current Waste Encapsulation and Storage Facility mission is to receive and store the cesium and strontium capsules in a safe manner and in compliance with all applicable rules and regulations. There are currently no production activities at the Waste Encapsulation and Storage Facility, but there are several operating systems required to accomplish the current mission (e.g., receiving and storing various chemicals from commercial suppliers for conditioning of water used in the heating, ventilating, and air conditioning units).

Airborne Effluents

Airborne effluent streams from B Plant include those from the 291-B-1, 296-B-5 (closed), and 296-B-13 (closed) Stacks; 296-B-21 through -27 Gallery Exhausters; bulk chemical-storage tank vents; and aqueous makeup tank vents. The 291-B-1 Stack has a real-time monitor. Radionuclide constituents of interest include ^{90}Sr and ^{137}Cs.

Airborne effluent streams from the Waste Encapsulation and Storage Facility include those from the 296-B-10 Stack, 296-B-12 Emergency Jet (inactive, soon to be removed), and aqueous makeup tank vents. The 296-B-10 Stack has a real-time monitor. Radionuclide constituents of interest include ^{90}Sr and ^{137}Cs.

Liquid Effluents

The liquid effluent streams at B Plant include steam condensate (currently inactive), process condensate (currently inactive), chemical sewer (currently inactive), combined cooling water (currently inactive), sanitary sewer systems, and french drains.

The liquid effluent streams from the Waste Encapsulation and Storage Facility include the former B Plant chemical sewer, cooling water, sanitary sewer, and french drains. The chemical sewer and cooling water streams have real-time pH and flow monitors.

FEMP Determination

A FEMP is required because of the potential for radionuclide concentrations in the airborne effluents from the 291-B-1 and 296-B-10 Stacks to cause a dose to the maximally exposed individual >0.1 mrem/yr EDE. The FEMP (HNF-EP-0467-2) was issued in November 1997.

Plutonium Finishing Plant

This plant is located in the 200-West Area and consists of one primary processing facility and several ancillary buildings (i.e., 234-5Z, 236-Z, 231-Z, 232-Z, 241-Z, 242-Z, 243-Z, 270-Z, 291-Z, 2736-Z, 2736-ZA, and 2736-ZB). Hazardous material inventories include acetone, carbon tetrachloride, oxides of nitrogen, hydrogen chloride, hydrochloric acid, and nitric acid. Radionuclide inventories include ^{90}Sr, ^{137}Cs, ^{238}Pu, ^{239}Pu, ^{241}Pu, and ^{241}Am.

Airborne Effluents

One gaseous effluent stream (291-Z-1 Stack), which has a real-time monitor, was determined to require a FEMP based on the potential for the calculated EDE to the maximally exposed individual to exceed 0.1 mrem/yr.

Liquid Effluents

One liquid effluent stream (216-Z-20 Crib) was discontinued in 1995.

FEMP Determination

A FEMP is required for the Plutonium Finishing Plant because of the potential for radionuclide concentrations in airborne effluents from the 291-Z-1 Stack to cause a dose to the maximally exposed individual >0.1 mrem/yr EDE. The FEMP (HNF-EP-0476-2) was issued in November 1997.

Plutonium-Uranium Extraction (PUREX) Plant

The PUREX Plant is located in the 200-East Area and is a collection of buildings and facilities for the processing by chemical separation of irradiated fuel elements for use in nuclear weapons production. The primary components of the plant are the 202-A Building (main canyon building) in which fuels were reprocessed, 203-A Pumphouse and Tank Farm, 211-A Pumphouse and Tank Farm, 206-A Acid Fractionator Building, 291-AE Building, 293-A Building (backup facility), effluent-monitoring buildings, and railroad tunnel. The plant has been deactivated (i.e., prepared for long-term, safe, unstaffed surveillance).

Airborne Effluents

The PUREX Plant is the source of one active, principal, airborne effluent stream (i.e., 291-A-1 Stack). Gaseous effluents continue to be discharged during its deactivation mode to provide control of trace quantities of contamination. The stack has the potential to exceed 40 CFR 61, Subpart H criteria requiring continuous emissions measurement and will require selective air monitoring for ^{239,240}Pu and ^{241}Am.

Liquid Effluents

All liquid effluent streams have been eliminated.

FEMP Determination

A FEMP is required for the PUREX Plant because of the potential for radionuclide concentrations in the airborne effluent from the 291-A-1 Stack to cause a dose to the maximally exposed individual >0.1 mrem/yr EDE. The FEMP will be reissued by Bechtel Hanford, Inc. after transition from Fluor Daniel Hanford, Inc.

Tank Farm Complex

The tank farm complex is located within the 200-East and 200-West Areas. A total of 177 single-shell and double-shell tanks with transfer, receiving, and treatment facilities make up the complex. Major components evaluated for the FEMP include the single- and double-shell tank farms, 204-AR Unloading Station, 244-CR Vault, double-contained receiver tanks, and waste transfer lines. No upset scenarios considered for the transfer lines would produce a release requiring a FEMP. Chemical constituents include iron(III) hydroxide, sodium aluminate, sodium carbonate, sodium hydroxide, sodium nitrate, sodium nitrite, sodium phosphate, sodium sulfate, and various organic compounds. Radionuclides include ^{14}C, ^{63}Ni, ^{90}Sr, ^{93}Zr, ^{99}Tc, ^{106}Ru, ^{126}Sn, ^{129}I, ^{135}Cs, ^{137}Cs, ^{151}Sm, ^{226}Ra, ^{230}Th, ^{233}U, ^{234}U, ^{235}U, ^{237}Np, ^{238}U, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am, ^{243}Am, and ^{244}Cm.

Airborne Effluents

Sixteen stacks were identified in the stack source assessment (WHC-EP-0894) and each requires a FEMP, based on the calculated potential for each stack of >0.1 mrem EDE to the maximally exposed offsite individual.

Liquid Effluents

The liquid effluents include those from the 241-AY/AZ Tank Farm steam coil condensate to 216-A-8 Crib, 241-A Tank Farm surface condenser cooling water to the 216-B-3 Pond, 241-SX Tank Farm sludge cooler to the 216-S-25 Crib, and 244-AR Vault coolant water to the 216-B-3 Pond. These effluents are routinely sampled.

FEMP Determination

A FEMP is required for the tank farm complex because of the potential for radionuclide concentrations in airborne effluents from each of several stacks to cause a dose to the maximally exposed individual >0.1 mrem/yr EDE. The FEMP (HNF-EP-0479-1) was updated in 1997.

Waste Receiving and Processing Facility (Module 1)

This facility is located in the 200-West Area and is housed in the 2336-W Building just north of the Central Waste Complex. The facility is a metal building, consisting of preinsulated, prefinished metal, interlocking roof, and wall sandwich panels. The facility will become operational in the fall of 1997 and provide waste processing; shipping and receiving; mechanical, electrical, heating, ventilating, and cooling rooms; as well as administrative areas.

Airborne Effluents

The gaseous effluent-monitoring/-sampling system operates to collect near-isokinetic samples for compliance with 40 CFR 61, Subpart H and WAC 246-247. The stack has sample probes that divert a representative sample of the exhaust stream via transport tubing to the sampling/monitoring cabinet. The transport lines are heat traced to prevent condensation within the tubing. A record sampler inside the sampling/monitoring cabinet collects a sample for laboratory analysis. A continuous air monitor scans the sample for alpha/beta contamination that exceeds concentration limits. The stack also houses a temperature probe and a velocity probe. The flow through the systems is established and maintained by vacuum pumps and is measured by flow-measuring sensors.

Liquid Effluents

The facility is equipped with a TRUPACT-II (transuranic package transporter) loading and unloading bay with a full-length floor drain to divert melting snow and ice to the proper disposal location. The TRUPACT bay also has potable water for hosing off vehicles. The drain runs out of the east side of the facility to a sand interceptor. From the sand interceptor, the stream is discharged to a gravel drain basin. The discharge stream from the TRUPACT bay has been listed in the site inventory of miscellaneous streams. The sludge that accumulates in the drain is sampled for hazardous and radioactive constituents, and any liquid is sampled for hazardous and radioactive material during clean out.

The facility has a mechanical room that houses two compressors, an air dryer, several pumps, and a domestic water heater. The condensate that builds up in the compressor is combined with the air dryer condensate and discharged to a gravel basin on the north side of the facility. The condensate passes through an oil/water separator prior to discharge to the environment. The effluent will be periodically sampled, pending the establishment of State of Washington Department of Ecology guidelines on sampling and analysis.

FEMP Determination

The estimated potential hazardous material quantities do not exceed their respective 40 CFR 302 reportable quantities on a 24-h basis. Therefore, no federal, state, and local effluent regulations, as well as DOE Orders, require any special regulated material-monitoring requirements. However, the potential EDE for radioactive constituents does exceed the continuous emission measurement criteria listed in 40 CFR 61, Subpart H. Therefore, full compliance is required and a FEMP (HNF-EP-0885, Rev. 1) was issued in 1997.

222-S Laboratory

The 222-S Laboratory complex is located in the 200-West Area. The laboratory complex provides analytical and radiological chemistry services for the Hanford Site. The principal components include the 222-S Main Laboratory, 222-SA Laboratory (nonradioactive standards and "cold" process development), 2716-S Storage Facility, 222-S Annex, 207-SL Retention Basin, 219-S Waste Handling Facility, 222-SD Solid Waste Handling and Storage System, 222-SC Filter Building, 222-SB Filter Building, 218-W-7 Dry Waste Burial Vault, and 216-S-26 Crib. Because of the nature of the laboratory complex, the inventories of both radionuclides and hazardous materials are extensive.

Airborne Effluents

Calculations and real-time monitoring show no gaseous effluent streams that would exceed 40 CFR 61, Subpart H criteria.

Liquid Effluents

Three liquid effluent streams, all of which have real-time monitors, were identified as requiring a FEMP based on their potential for releasing hazardous waste under upset conditions. The facilities from which these streams originate include the 207-SL Retention Basin (part of 222-S), 222-SA Laboratory, and 219-S Waste Handling Facility.

FEMP Determination

A FEMP is required for the 222-S Laboratory because of the potential, during upset conditions, for liquid effluents from each of the three liquid effluent streams to exceed the reportable quantity in 40 CFR 302. The FEMP (HNF-EP-0480-2) was updated in 1997.

324 Facility

The 324 Facility in the 300 Area primarily supports the research and development of radioactive and nonradioactive waste vitrification technologies (i.e., ceramic melters, in situ vitrification, and Hanford Waste Vitrification Program design support), biological waste remediation technologies, spent nuclear fuel studies, waste mixing and transport studies, and tritium development programs. All of the above-mentioned programs deal with and have the potential to release hazardous and/or radioactive material. The potential for discharge would primarily result from 1) conduct of research activities using the hazardous materials, 2) storage of radionuclides and hazardous chemicals, 3) archive storage of programmatic samples, and 4) waste accumulation and storage.

Airborne Effluents

Potential radioactive airborne effluents in the 324 Facility have been characterized, and all release pathways have been verified. Stack monitors (samplers) were upgraded to meet 40 CFR 61 criteria. The primary stack (EP-324-01-S) is currently registered with the State of Washington as required by WAC 246-247. Potential nonradioactive airborne effluents have been characterized for compliance with WAC 173-401 (i.e., the air operating permit regulations) and a permit is expected to be issued in February 1998.

Liquid Effluents

This facility discharges to four sewer systems (radioactive liquid waste system, retention process sewer, process sewer, and sanitary sewer). Liquid effluent releases are either administratively or physically controlled. Most connections to the process sewer that have the potential to release regulated effluent have been plugged. Floor and sump drains have been modified with standpipes to prevent uncontrolled discharge. Selected floor drains in facility service tunnels that must remain open in the event of main service line leaks or ruptures are posted to control liquid effluent disposal. Verification of the radioactive liquid waste system, retention process sewer, and process sewer liquid effluent lines is proceeding as part of an ongoing program. Liquid effluent lines from the facility enter the 300 Area liquid effluent system. This system is monitored before release to the environment. The radioactive liquid waste system is not released to the environment but is transferred to the 340 Complex and then to the 200 Area tank farms.

A sampling program for liquid effluents from this facility is under way. Liquid effluent-monitoring instruments are being installed, including a flow-proportional liquid sampler, in-line pH meter, and conductivity meter. Sampling of the liquid effluents will commence when the samplers are installed.

FEMP Determination

An inventory-based method was used to estimate the maximum potential offsite dose if airborne releases from the facility were unmitigated. The projected unmitigated dose met the criterion (>0.1 mrem/yr EDE) for preparing a FEMP. A list of chemicals in the facility was obtained; chemicals in greater-than-reportable quantities were identified to characterize the potential for emissions of non-radioactive hazardous materials. The FEMP (PNL-MA-660) was updated in 1994.

325 Building

This building (the Applied Chemistry Laboratory) in the 300 Area houses radiochemistry research, radioanalytical service, radiochemical process development, and hazardous and mixed hazardous waste-treatment activities. The laboratories and specialized facilities enable work, ranging from that with nonradioactive materials to that with picogram-to-kilogram quantities of fissionable materials and up to megacurie quantities of other radionuclides. The special facilities include two shielded hot cell areas that provide for process development or analytical chemistry work with highly radioactive materials and a waste-treatment facility for processing hazardous, mixed, low-level, and transuranic wastes.

Radioactive material storage and usage occur throughout the building and include a large number of isotopes. This material is in several forms, including solid, liquid, particulate, and gaseous. Some of these materials are also heated during testing.

Airborne Effluents

Potential radioactive airborne effluents have been characterized, and all release pathways have been verified. Stack monitors (samplers) were upgraded to meet 40 CFR 61 criteria. The primary stack (EP-325-01-S) is currently registered with the State of Washington Department of Health as required by WAC 246-247. Potential nonradioactive airborne effluents have been characterized for compliance with WAC 173-401 (i.e., the air operating permit regulations) and a permit is expected to be issued in February 1998.

Liquid Effluents

Liquid effluent release pathways are either administratively or physically controlled. Most connections to the process sewer that have the potential to release regulated effluents have been plugged. The remaining drains (primarily laboratory sink and hood drains) have been posted with labels identifying the type of drain and liquid effluent-disposal controls.

This building has three liquid effluent systems (i.e., radioactive liquid waste system, retention process sewer, and sanitary sewer). Because of the age of the building and the out-of-date drawings, some lines were found to be labeled (and used) inappropriately during liquid effluent line verification. Modifications were completed as soon as the lines were correctly identified. The retention process sewer and radioactive liquid waste system lines from the building enter the 300 Area liquid effluent system. The system is monitored before release to the environment. The radioactive liquid waste system is not released into the environment but is transferred to the 340 Complex and then to the 200 Area tank farms.

Liquid effluent-monitoring instruments, including a flow-proportional liquid sampler, in-line pH meter, and conductivity meter, are maintained for sampling in response to potential concerns at the 300 Area Treated Effluent Disposal Facility.

FEMP Determination

An inventory-based method was used to estimate the maximum potential offsite dose if airborne releases from the building were unmitigated. The projected unmitigated dose met the criterion (>0.1 mrem/yr EDE) for preparing a FEMP. A list of chemicals in the building was obtained; chemicals in greater-than-reportable quantities were identified to characterize the potential for emissions of non-radioactive hazardous materials. The FEMP (PNL-MA-661) was updated in 1994.

327 Facility

The 327 Facility in the 300 Area provides office and laboratory space for scientific and engineering staff who conduct multidisciplinary research in the areas of postirradiated fuels and structural materials. The building is designed to accommodate the use of radioactive and hazardous materials in the conduct of these research activities.

Airborne Effluents

The potential radioactive airborne effluents from this facility have been characterized, and all release pathways have been verified. Stack monitors (samplers) were upgraded to meet 40 CFR 61 criteria. Two stacks (EP-327-01-S and EP-327-02-V) are currently registered with the State of Washington Department of Health as required by WAC 246-247. Potential nonradioactive airborne effluents have been characterized for compliance with WAC 173-401 (i.e., the air operating permit regulations) and a permit is expected to be issued in February 1998.

Liquid Effluents

This facility discharges liquid effluents to four sewer systems (i.e., radioactive liquid waste system, retention process sewer, process sewer, and sanitary sewer). Liquid effluent releases are either administratively or physically controlled. Most connections to the process sewer that have the potential to release regulated effluent have been plugged; the remaining (primarily laboratory sink and hood drains) have been posted with labels identifying the type of drain and liquid effluent-disposal instructions. Floor and sump drains have been modified with standpipes to prevent uncontrolled discharge. Selective floor drains in facility service tunnels that must remain open in the event of main service line leaks or ruptures are also posted to control disposal of liquid effluents. Verification of the liquid effluent lines is nearing completion.

Liquid effluent lines from the facility enter the 300 Area liquid effluent system. The retention process sewer, process sewer, and sanitary sewer are monitored before release to the environment. The radioactive liquid waste system is not released to the environment but is transferred to the 340 Complex and then to the 200 Area tank farms.

A program to characterize the liquid effluents from this facility is under way. Liquid effluent-monitoring instruments are being installed, including a flow-proportional liquid sampler, in-line pH meter, and conductivity meter. Sampling the liquid effluents will commence when the samplers are installed.

FEMP Determination

An inventory-based method was used to estimate the maximum potential offsite dose if airborne releases from the building were unmitigated. The projected unmitigated dose met the criterion (>0.1 mrem/yr EDE) for preparing a FEMP. A list of chemicals in the building was obtained; chemicals in greater-than-reportable quantities were identified to characterize the potential for emissions of nonradioactive hazardous materials. The FEMP (PNL-MA-662) was updated in 1994.

340 Complex

The 340 Complex is located in the 300 Area near the Columbia River. Buildings that can discharge waste directly into the 340 Complex include 324, 325, 326, 327, and 329. Wastes from other facilities can be transferred to the complex via 208-L (55-gal) drums, carboys, or other containers to a floor sump in the 340 Building. Two waste streams are managed by the 340 Complex, the radioactive liquid waste system and the retention process sewer. Inventories of both radionuclides and hazardous materials are extensive and are itemized in the FEMP.

Airborne Effluents

The radioactive liquid waste system, which has real-time monitors, has the potential to release gaseous/particulate radioactive contaminants to the atmosphere. The system receives wastes from several sources and stores the wastes in one of the two belowground 56,775-L (15,000-gal) storage tanks. The stored waste is then transported quarterly to the 204-AR Unloading Facility in the 200-East Area for long-term storage/disposal.

Liquid Effluents

The retention process sewer receives potentially radioactive liquid effluents. The liquid effluents from this sewer are monitored for gross beta and gamma radiation with real-time monitoring instruments. If radiation is not detected, the waste stream is disposed to the soil column via an unlined trench. The disposal to the soil column was eliminated in January 1995 and the waste stream diverted to the 300 Area Treated Effluent Disposal Facility.

FEMP Determination

A FEMP is required for the 340 Complex because of the potential for radionuclides in airborne emissions stacks to cause a dose to the maximally exposed individual >0.1-mrem/yr EDE. The FEMP (HNF-EP-0469-2) was issued in 1997.

3720 Facility

This facility (the Materials Science Laboratory) provides office and laboratory space for scientific and engineering staff who conduct multidisciplinary research in the areas of materials characterization and testing and waste management. The facility is designed to accommodate the use of radioactive and hazardous materials in the conduct of these activities.

Chemical storage and usage are well dispersed throughout the facility and consist of bulk materials (solvents, acids/bases), specimen materials used in materials characterization (e.g., beryllium alloys), substrate materials used in the conduct of laboratory experiments (e.g., chelating agents, nitrate, chromium and arsenic salts, inorganic oxides), and standards used for instrument calibration. A number of environmental or fabricated materials (i.e., grouts, coal, asphalts) are used in the conduct of leaching experiments or materials-testing activities.

Airborne Effluents

Potential radioactive airborne effluents in the 3720 Facility have been characterized, and all release pathways have been verified. Stack monitors (samplers) were upgraded to meet 40 CFR 61 criteria. The primary stack at the 3720 Facility (EP-3720-01-S) is currently registered with the State of Washington Department of Health as required by WAC 246-247. Potential nonradioactive airborne effluents have been characterized for compliance with WAC 173-401 (i.e., the air operating permit regulations) and a permit is expected to be issued in February 1998.

Liquid Effluents

This facility discharges to the process sewer and the sanitary sewer. Liquid effluent releases are either administratively or physically controlled. Most connections to the process sewer that had the potential to release regulated effluent have been plugged; the remaining (primarily laboratory sink and hood drains) have been posted with labels identifying the type of drain and liquid effluent-disposal controls.

Process sewer effluent lines from the facility enter the 300 Area Treated Effluent Disposal Facility. Sanitary sewer effluent lines from the facility join with the sanitary sewer lines from other 300 Area facilities and enter the City of Richland's publicly owned treatment works. Liquids in the process and sanitary sewers are treated and monitored before release to the environment. Results of the program are documented in PNNL-11552. Liquid effluent-monitoring instruments, including a flow-proportional liquid sampler, in-line pH meter, and conductivity meter, are maintained for sampling in response to potential concerns at the 300 Area Treated Effluent Disposal Facility.

FEMP Determination

An inventory-based method was used to estimate the maximum potential offsite dose if airborne releases from the building were unmitigated. The projected unmitigated dose met the criterion (>0.1 mrem/yr EDE) for preparing a FEMP. A list of chemicals in the facility was obtained; chemicals in greater-than-reportable quantities were identified to characterize the potential for emissions of non-radioactive hazardous materials. The FEMP (PNL-MA-663) was updated in 1994.

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